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MACHINES FOR TESTING HIGH-SPEED GRINDING WHEELS

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High-speed grinding of parts for machine and instrument building requires grinding wheels that have been thoroughly tested by the manufacturing plant.

GOST 3981-47 specifies that immediately before being mounted on grinding machines, all grinding wheels 150 or more millimeters in diameter intended for work with surface speeds of 15 or more meters per second should be tested for strength by being rotated 50 percent faster than the normal work speed.

The projected norm of the abrasives industry, "High-Speed Grinding Wheels. Technical Specifications," requires a more stringent inspection of wheels; in particular, wheels 30 or more millimeters in diameter must be inspected for strength. Wheels for use at high grinding speeds of 50 or more meters per second should be tested at surface speeds of 80-100 meters per second.

Super-high wheel speeds are difficult to achieve in testing wheels of small diameters (30-80 millimeters and, in the next range, 100-250 millimeters). Under these conditions, the spindle speed of the testing machine must be:

Diameter (in mm)

Speed (in rpm)

30-80

64,000-24,000

100-250

19,100-7,600

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CLASSIFICATION

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The following group of machines has been designed for testing high-speed abrasive wheels:

<u>Diameter of Wheels (in mm)</u>	<u>Model No</u>
30-80	IA-15 [referred to as IA-115 below]
100-250	LT-1
300-750	LT-7
650-1,300	LT-8

All of these machines give the wheel being tested a surface speed limit of 100 meters per second. The first two type-sizes have been designed on a new principle of a high-speed friction transmission.

Machines for wheels 300-1,300 millimeters in diameter, with a surface speed limit of 100 meters per second, have a drive of conventional design.

The spindle of the IA-115 machine rotates at a speed of 64,000 rpm. The headstock is driven by a 2.4-kilowatt, 2,850-rpm PM-10 electric motor.

In principle, the Model LT-7 machine is identical with the IA-115. However, it has a more powerful motor (5.3 kilowatts) and a slower spindle speed (up to 19,200 rpm).

A special experimental device, Model EIA-115, has been designed for testing the newly developed method of high-speed friction transmission of rotation in order to obtain high spindle speeds on long-lasting bearings which will withstand heavy loads. The EIA-115 high-speed friction drive, which is a prototype of the Model IA-115 testing machine and which has the same kinematic system, was assembled at the VNIISH (All-Union Scientific Research Institute of Abrasive and Grinding) experimental plant. The basic and most important parts of the device were manufactured or finished at the LIT (Leningrad Tool Plant) and the (Leningrad) Plant iment [?].

After initial testing at the VNIISH plant, the drive was further tested at the VNIISH laboratory of grinding and lapping. The drive was installed on a special support of an IR-500 machine for testing grinding wheels. This was done to utilize the transmitting mechanism of the IR-500 machine and, in particular, its variable speed gear.

The tests conducted on the EIA-115 high-speed friction drive showed its high quality, in spite of a number of shortcomings in the operation of the experimental drive.

Present Soviet high-speed drives operate at a speed of 20,000-40,000 rpm. However, their bearings under the most favorable conditions last only several hours even with light loads.

The spindle of the EIA-115 drive has speeds up to 100,000 rpm and a long bearing life under normal operation conditions. The spindle bearings can withstand a load of hundreds of kilograms.

This type of friction drive has many potential uses in various branches of machine and instrument building.

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Among the shortcomings in its design are the following:

1. The noise produced while it is in operation,
2. The difficulty of metering the lubricant, and
3. The need for high-quality basic parts for the drive.

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